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| EXAMINER | |
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| FOGARTY, CAITLIN ANNE | |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/589,215 | BISCHOFBERGER, ULRICH | |
| | Examiner | Art Unit | |
| | CAITLIN FOGARTY | 1793 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *04 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *16-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-19 and 21-33* is/are rejected.

7)☒ Claim(s) *20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 4, 2009 has been entered.

### *Status of Claims*

2. Claims 16 – 33 are pending and are new. Claims 1 – 15 have been cancelled.

### *Status of Previous Rejections*

3. The 35 U.S.C. 103(a) rejection of claims 1, 5 – 11, 14, and 15 as being unpatentable over Lee et al. (US 6,419,769) in view of Schmid et al. (US 5,178,686) and further in view of the admitted prior art on p. 5 paragraph 3 of the instant specification has been withdrawn since claims 1, 5 – 11, 14, and 15 have been cancelled.

The 35 U.S.C. 103(a) rejection of claim 2 as being unpatentable over Lee et al. (US 6,419,769) in view of Schmid et al. (US 5,178,686) and further in view of the admitted prior art on p. 5 paragraph 3 of the instant specification and further in view of Volume 7 of the 1998 9th Edition *ASM Handbook* has been withdrawn since claim 2 has been cancelled.

The 35 U.S.C. 103(a) rejection of claims 3 and 4 as being unpatentable over Lee et al. (US 6,419,769) in view of Schmid et al. (US 5,178,686) and further in view of the

admitted prior art on p. 5 paragraph 3 of the instant specification and further in view of Volume 15 of the 1988 9th Edition *ASM Handbook* has been withdrawn since claims 3 and 4 have been cancelled.

***Inventorship***

4. In view of the papers filed March 13, 2009, it has been found that this nonprovisional application, as filed, through error and without deceptive intent, improperly set forth the inventorship, and accordingly, this application has been corrected in compliance with 37 CFR 1.48(a). The inventorship of this application has been changed by the addition of Peter Krug and Gero Sinha as additional inventors.

The application will be forwarded to the Office of Initial Patent Examination (OIPE) for issuance of a corrected filing receipt, and correction of Office records to reflect the inventorship as corrected.

***Priority***

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 30 recites that "traces of beryllium are added to the alloy". However, the instant specification does not have literal support for the term "traces" and only mentions beryllium in Examples 1-3 of the specification where each aluminum alloy comprises 50 ppm of beryllium.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 29 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claim 29 recites the limitation "hot-forming the alloy block subsequent to *the spray compacting step*" in lines 13-14. There is insufficient antecedent basis for this limitation in the claim. For examination purposes, it will be assumed that "the spray compacting step" is a typographical error and should recite "the producing step". Claim 30 is dependent on claim 29 and therefore recites the same claim limitation that is lacking antecedent basis. There is no prior art rejection for claim 29 or claim 30.

***Claim Rejections - 35 USC § 103***

11. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

12. Claims 16, 18, 19, and 21 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,419,769) in view of Schmid et al. (US 5,178,686) and further in view of Volume 14 of the 1988 9$^{th}$ Edition *ASM Handbook*.

With respect to instant claim 16, col. 4 lines 40-61 of Lee teach a method for production of a high-strength material. The method of Lee comprises producing a block of an aluminum based alloy. Then, the block is subjected to heat treatment consisting of solution heat treatment, quenching, and artificial aging.

Lee differs from instant claim 16 because it does not teach an aluminum-based alloy with a composition that overlaps with the composition recited in the instant claim. However, col. 2 lines 24-68 of Schmid teach an aluminum-based alloy with an overlapping composition. The alloy of Schmid has a composition of up to 15 wt% Si, up to 5 wt% Cu, 5-25 wt% magnesium silicide (1.73 x Si), and the remainder aluminum, where the silicon may be replaced entirely or in part by magnesium in an amount of up to 15 wt% (m). Therefore, the compositions of Si, Mg, Cu, and Al in the alloy of Schmid overlap with the compositions of Si, Mg, Cu, and Al in instant claim 16. The formula in claim 16 is also satisfied by the alloy of Schmid where the term "1.73 x Si" is satisfied by the composition of magnesium silicide and the term "m" is satisfied by the fact that the silicon may be replaced entirely or in part by magnesium in an amount of up to 15 wt%. Furthermore, it is well settled that there is no invention in the discovery of a general formula if it covers a composition described in the prior art, *In re Cooper and Foley* 1943 C.D. 357, 553 O.G. 177; 57 USPQ 117, *Taklatwalla v. Marburg*, 620 O.G. 685, 1949 C.D. 77, and *In re Pilling*, 403 O.G. 513, 44 F(2) 878, 1931 C.D. 75. In the absence of evidence to the contrary, the selection of the proportions of elements would appear to require no more than routine investigation by those ordinary skilled in the art. *In re Austin, et al.*, 149 USPQ 685, 688. It would have been obvious to one of ordinary skill

in the art to use the aluminum-based alloy of Schmid in the method of Lee in order to produce a piston for an internal combustion engine with improved properties that is lightweight, reduces the fuel consumption and the emission of pollutants, and has a high carrying capacity (see col. 1 lines 8-17 of Schmid).

Lee also differs from instant claim 16 because it does not teach the step of hot-forming the base alloy block into a hot-formed element in at least one hot-forming step subsequent to the producing step. However, it would have been obvious to one of ordinary skill in the art to subject the base alloy block of Lee to hot-forming in at least one hot-forming step subsequent to the producing step and before heat treatment in order to create a desired shape of the alloy because it is well known in the art to hot-form aluminum alloys at least once after casting an ingot in order to create a desired shape followed by heat treatment of the aluminum alloy as evidenced by p. 241-244 of Volume 14 of the 1988 9$^{th}$ Edition *ASM Handbook*.

In regards to instant claims 18 and 19, col. 4 lines 49-55 of Lee teach that the producing step comprises casting. Lee differs from instant claims 18 and 19 because it does not specifically teach that the casting may be either continuous casting or chill casting. However, Lee does not specifically teach that only a certain type of casting may be used and therefore the casting step of Lee encompasses continuous casting and chill casting. It would have been obvious to one of ordinary skill in the art to use continuous casting in the casting step of Lee in order to increase the efficiency of the method of Lee. Also, it would have been obvious to one of ordinary skill in the art to use

chill casting in the casting step of Lee in order to eliminated intermediate mechanical working processes by casting near-net shapes.

With respect to instant claim 21, Lee in view of Schmid differs from instant claim 21 because they do not teach that the hot-forming step is selected from the group consisting of extrusion, hot rolling, and forging. However, it would have been obvious to one of ordinary skill in the art to subject the base alloy block of Lee to hot-forming, for example by forging, in at least one hot-forming step subsequent to the producing step and before heat treatment in order to create a desired shape of the alloy because it is well known in the art to hot-form aluminum alloy, by forging for example, at least once after casting an ingot in order to create a desired shape followed by heat treatment of the aluminum alloy as evidenced by p. 241-244 of Volume 14 of the 1988 9$^{th}$ Edition *ASM Handbook*.

In regards to instant claim 22, Lee in view of Schmid and further in view of Volume 14 of the *ASM Handbook* differ from instant claim 22 because they do not teach that the hot forming step comprises a degree of deformation exceeding five. However, it would have been obvious to one of ordinary skill in the art to subject the aluminum-based alloy to the known method of hot-forming disclosed in Volume 14 of the *ASM Handbook* with a necessary degree of deformation in order to form the alloy into a desired final shape and size.

Regarding instant claim 23, col. 2 lines 24-68 of Schmid teach that the content of copper in the base alloy is up to 5 wt% which overlaps with the range of copper recited in the instant claim.

With respect to instant claim 24, col. 2 lines 24-68 of Schmid disclose that the aluminum-based alloy may also comprise up to 5 wt% of manganese, copper, nickel, or cobalt which overlaps with the range of foreign elements recited in the instant claim.

In regards to instant claim 25, col. 4 lines 40-61 of Lee teach that the heat treatment step consists of solutionizing the aluminum alloy at 900-1000°F (482-538°C) for 15 minutes to 4 hours which overlaps with the temperature and time recited in instant claim 25. Then, Lee discloses that the alloy is quenched in water and annealed at a temperature of 425°F (218°C) for 6-12 hours. The annealing time overlaps with the instant recited range and the temperature of Lee is very close to the temperature recited in instant claim and therefore would be expected to have a similar effect on the aluminum alloy. See MPEP 2144.05.

Regarding instant claim 26, Lee in view of Schmid and further in view of Volume 14 of the *ASM Handbook* teach a material on the basis of an aluminum alloy that can be obtained by the method according to claim 16 as discussed above for claim 16.

With respect to instant claim 27, col. 4 lines 40-61 of Lee teach that the material is shaped as a piston for an internal combustion engine.

Since the claimed compositional ranges of claims 16, 18, 19, and 21 – 27 either overlap or are within the ranges disclosed by Schmid, a prima facie case of obviousness exists. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed aluminum alloy composition from the aluminum alloy composition disclosed by Schmid

because Schmid teaches the same utility (i.e. aluminum alloy for an internal combustion engine component) in the whole disclosed range.

13. Claims 17 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 6,419,769) in view of Schmid et al. (US 5,178,686) and further in view of Volume 14 of the 1988 9th Edition *ASM Handbook*, and further in view of Volume 7 of the 1998 9th Edition *ASM Handbook*.

Lee in view of Schmid and further in view of Volume 14 of the *ASM Handbook* is applied to claim 16 as discussed above.

Lee in view of Schmid and further in view of Volume 14 of the *ASM Handbook* differs from instant claim 17 because it does not teach that the producing step comprises spray compacting. However, it would have been obvious to one of ordinary skill in the art to produce the base alloy block by spray compacting in the method of Lee in view of Schmid and further in view of Volume 14 of the *ASM* Handbook, rather than casting as disclosed in Lee, in order to produce an aluminum alloy product with low oxygen and hydrogen levels and a refined uniform microstructure in order to optimize the mechanical properties of the alloy because it is well known in the art that spray compacting creates aluminum alloys with those properties as evidenced by p. 396-397 of Volume 7 of the 1998 9th Edition *ASM Handbook*.

With respect to instant claim 28, col. 4 lines 40-61 of Lee teach a method for production of a high-strength material. The method of Lee comprises casting a block of an aluminum based alloy. Then, the block is subjected to heat treatment consisting of solution heat treatment, quenching, and artificial aging.

Lee differs from instant claim 28 because it does not teach an aluminum-based alloy with a composition that overlaps with the composition recited in the instant claim. However, col. 2 lines 24-68 of Schmid teach an aluminum-based alloy with an overlapping composition. The alloy of Schmid has a composition of up to 15 wt% Si, up to 5 wt% Cu, 5-25 wt% magnesium silicide (1.73 x Si), and the remainder aluminum, where the silicon may be replaced entirely or in part by magnesium in an amount of up to 15 wt% (m). Therefore, the compositions of Si, Mg, Cu, and Al in the alloy of Schmid overlap with the compositions of Si, Mg, Cu, and Al in instant claim 28. The formula in claim 28 is also satisfied by the alloy of Schmid where the term "1.73 x Si" is satisfied by the composition of magnesium silicide and the term "m" is satisfied by the fact that the silicon may be replaced entirely or in part by magnesium in an amount of up to 15 wt%. Furthermore, it is well settled that there is no invention in the discovery of a general formula if it covers a composition described in the prior art, *In re Cooper and Foley* 1943 C.D. 357, 553 O.G. 177; 57 USPQ 117, *Taklatwalla v. Marburg*, 620 O.G. 685, 1949 C.D. 77, and *In re Pilling*, 403 O.G. 513, 44 F(2) 878, 1931 C.D. 75. In the absence of evidence to the contrary, the selection of the proportions of elements would appear to require no more than routine investigation by those ordinary skilled in the art. *In re Austin, et al.*, 149 USPQ 685, 688. It would have been obvious to one of ordinary skill in the art to use the aluminum-based alloy of Schmid in the method of Lee in order to produce a piston for an internal combustion engine with improved properties that is lightweight, reduces the fuel consumption and the emission of pollutants, and has a high carrying capacity (see col. 1 lines 8-17 of Schmid).

Lee also differs from instant claim 28 because it does not teach the step of hot-forming the base alloy block into a hot-formed element in at least one hot-forming step subsequent to the producing step. However, it would have been obvious to one of ordinary skill in the art to subject the base alloy block of Lee to hot-forming in at least one hot-forming step subsequent to the producing step and before heat treatment in order to create a desired shape of the alloy because it is well known in the art to hot-form aluminum alloys at least once after casting an ingot in order to create a desired shape followed by heat treatment of the aluminum alloy as evidenced by p. 241-244 of Volume 14 of the 1988 9th Edition *ASM Handbook*.

Lee in view of Schmid and further in view of Volume 14 of the *ASM Handbook* differs from instant claim 28 because it does not teach that the producing step comprises spray compacting a block of aluminum-based alloy. However, it would have been obvious to one of ordinary skill in the art to produce the base alloy block by spray compacting in the method of Lee in view of Schmid and further in view of Volume 14 of the *ASM* Handbook, rather than casting as disclosed in Lee, in order to produce an aluminum alloy product with low oxygen and hydrogen levels and a refined uniform microstructure in order to optimize the mechanical properties of the alloy because it is well known in the art that spray compacting creates aluminum alloys with those properties as evidenced by p. 396-397 of Volume 7 of the 1998 9th Edition *ASM Handbook*.

Since the claimed compositional ranges of claims 17 and 28 either overlap or are within the ranges disclosed by Schmid, a prima facie case of obviousness exists. See

MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed aluminum alloy composition from the aluminum alloy composition disclosed by Schmid because Schmid teaches the same utility (i.e. aluminum alloy for an internal combustion engine component) in the whole disclosed range.

14. Claims 31 – 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adam et al. (US 4,917,739).

With respect to instant claim 31, col. 1 lines 12-20 and col. 3 lines 5-20 of Adam teach an aluminum-based alloy comprising 2-20 wt% of at least one element selected from the group consisting of **Fe**, Co, Ti, V, Ni, Zr, **Cu**, **Mg** and Mn, 2.1-20 wt% **Si**, and the balance aluminum and inevitable impurities. The composition of the aluminum-based alloy of Adam overlaps with the composition of the alloy L1 recited in instant claim 31. Adam differs from instant claim 31 because it does not specifically teach that the aluminum based alloy comprises 50 ppm beryllium. However, this is an impurity level and therefore in the absence of evidence to the contrary, the examiner assumes that an impurity level of 50 ppm beryllium in the aluminum alloy would not have an effect on the properties of the claimed aluminum alloy and therefore one of ordinary skill in the art would have expected the alloy of Adam to have properties similar to the properties of the instant claimed alloy.

In regards to instant claim 32, Adam does not specifically teach that the alloy is shaped as an internal combustion engine component. However, this is a product-by-process limitation and even though product-by-process claims are limited by and

defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. See MPEP 2113. However, it would have been obvious to one of ordinary skill in the art to shape the alloy of Adam into an internal combustion engine component because the aluminum alloy of Adam has high toughness and tensile strength which are desired properties of internal combustion engine components.

Regarding instant claim 33, Adam does not specifically teach the process of obtaining the claimed alloy. However, claim 33 is a product-by-process claim and therefore only the structure implied by the process steps is considered when assessing the patentability of the claim. See MPEP 2113. Therefore, in the absence of evidence to the contrary, the Examiner takes the position that the claimed process steps do not add any additional structural limitations to the claimed alloy and therefore the alloy of Adam is very similar to the alloy of the instant claims since it has an overlapping composition.

Since the claimed compositional ranges of claims 31 – 33 either overlap or are within the ranges disclosed by Adam, a prima facie case of obviousness exists. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed aluminum alloy composition from the aluminum alloy composition disclosed by Adam because Adam teaches the same utility

(i.e. aluminum alloy with high toughness and high tensile strength) in the whole disclosed range.

***Allowable Subject Matter***

15. Claim 20 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

16. Applicant's arguments filed September 4, 2009 in regards to the remaining pertinent prior art have been fully considered but they are not persuasive.

*Arguments are summarized as follows:*

a. Lee does not teach an alloy having a composition as claimed in the present invention, since in particular the copper content is completely different. Lee explicitly states that the addition of significantly higher levels of magnesium would lead to a disadvantageous composition of the alloy. Further, Lee teaches to keep the ratio of silicon to magnesium in a range between 10 to 25, so that the intermetallic compound magnesium silicide forms only a minor strengthening phase and therefore Lee teaches away from using a high weight percentage of magnesium in the alloy.

b. Lee also does not teach a step of hot-forming prior to the heat treatment step and subsequent to the casting.

c. Schmid does not teach that an excess of Mg is mandatory, but rather teaches that Mg can easily be replaced by Si, achieving similar properties.

Schmid does not teach that at least 1.0 wt% Cu must be provided. Schmid does not teach a hot-forming step, and further does not teach a heat treatment step. Also, no suggestions of which specific casting method should be used are given.

d. Volume 7 of the *ASM Handbook* does not teach an alloy having the claimed composition.

e. Volume 14 of the *ASM Handbook* does not teach an alloy having the claimed composition.

f. The examples of the invention of Schmid have a magnesium composition of 2.1-3.2 which is a much lower amount for a secondary additional component.

g. A skilled person combining the teaching of Lee of a high amount of silicon and the teaching of Schmid of a preferably high amount of silicon would avoid the alternate solution of Schmid to replace silicon by magnesium, but rather might overweight silicon. Lee teaches away from a high level of magnesium in the aluminum alloy and from the alloy disclosed by Schmid. Schmid does not give any suggestion as to further process the cast alloy and therefore it would not be obvious to combine the teachings of Schmid and Lee.

h. There is no excess silicon in the material produced by Applicant's method and therefore no ternary Al-$Mg_2Si$-Si eutectic alloy is formed, as can be formed in the lightweight cast material disclosed in Schmid. Applicant's method produces an aluminum alloy material with a unique chemical composition resulting in a unique combination of properties including superior fatigue resistance and superior performance on static and dynamic tests.

*Examiner's responses are as follows:*

a. The Examiner relied on Lee for the disclosed method and on Schmid for the disclosed aluminum alloy composition. However, Lee teaches a method for high strength aluminum alloy with a similar composition. The Examiner maintains the position that it would have been obvious to one of ordinary skill in the art to use the aluminum-based alloy of Schmid in the method of Lee in order to produce a piston for an internal combustion engine with improved properties that is lightweight, reduces the fuel consumption and the emission of pollutants, and has a high carrying capacity (see col. 1 lines 8-17 of Schmid). Lee does not teach away from the claimed aluminum alloy composition or the aluminum alloy composition of Schmid but merely teaches that a significantly higher level of magnesium in the aluminum alloy will result in lower strength of the alloy which is not the purpose of Lee. Therefore, it would have been obvious to one of ordinary skill in the art that an aluminum alloy with a significantly higher level of magnesium than taught by Lee would have a lower alloy strength than that of the aluminum alloy of Lee.

b. The hot-forming step prior to the heat treatment step and subsequent to the casting step as recited in the new instant claims is addressed in the above rejections using a new secondary reference, Volume 14 of the 1988 9$^{th}$ Edition *ASM Handbook*.

c. The Schmid reference was relied on for the aluminum alloy composition and not the method of making the composition. Although Schmid does not teach

that an excess of Mg is mandatory, the presence of an excess of Mg in the aluminum alloy of Schmid is within the broadest scope of Schmid since col. 2 lines 24-68 of Schmid teach an aluminum-based alloy with a composition of up to 15 wt% Si, up to 5 wt% Cu, 5-25 wt% magnesium silicide (1.73 x Si), and the remainder aluminum, where the silicon may be replaced entirely or in part by magnesium in an amount of up to 15 wt% (m). In addition, the composition of Cu in the alloy of Schmid overlaps with the composition of Cu recited in the instant claims. Schmid is not required to recognize the benefits of always having an excess of Mg in the aluminum alloy or at least 1.0 wt% Cu. See MPEP 2144 IV. The hot-forming and heat treatment steps are addressed in the above rejections in view of Lee and Volume 14 of the 1988 9th Edition *ASM Handbook*.

d. Volume 7 of the *ASM Handbook* was relied on as evidence that it would have been obvious to one of ordinary skill in the art to produce the base alloy block by spray compacting in the method of Lee in view of Schmid and further in view of Volume 14 of the *ASM* Handbook, rather than casting as disclosed in Lee, in order to produce an aluminum alloy product with low oxygen and hydrogen levels and a refined uniform microstructure in order to optimize the mechanical properties of the alloy because it is well known in the art that spray compacting creates aluminum alloys with those properties as discussed in the above rejection. Therefore, Volume 7 is not required to teach an alloy having the claimed composition since its teachings are applicable to all aluminum alloys.

e. Volume 14 of the *ASM Handbook* was relied on as evidence that it would have been obvious to one of ordinary skill in the art to subject the base alloy block of Lee to hot-forming in at least one hot-forming step subsequent to the producing step and before heat treatment in order to create a desired shape of the alloy because it is well known in the art to hot-form aluminum alloys at least once after casting an ingot in order to create a desired shape followed by heat treatment of the aluminum alloy as discussed in the above rejections. Therefore, Volume 14 is not required to teach an alloy having the claimed composition since its teachings are applicable to all aluminum alloys.

f. The Examiner has relied on the broadest teachings of Schmid which teach an aluminum alloy with a composition that overlaps with the composition of the instant alloy as set forth in the above rejections. The scope of Schmid is not limited to the specific embodiments it teaches. See MPEP 2123.

g. The incorporation of Schmid in the method of Lee is a hypothetical combination and therefore the combination of the two references is not required to maintain all of the teachings of each reference. The Examiner suggests the hypothetical combination of using the aluminum alloy of Schmid in the method of Lee to improve the properties of the aluminum alloy. Therefore, the Examiner takes the position that it would have been obvious to one of ordinary skill in the art to use the aluminum-based alloy of Schmid (which has an overlapping composition with the composition of the instant alloy) in the method of Lee in order to produce a piston for an internal combustion engine with improved

properties that is lightweight, reduces the fuel consumption and the emission of pollutants, and has a high carrying capacity (see col. 1 lines 8-17 of Schmid).

h. The broadest teaching of Schmid discloses an aluminum alloy composition in col. 2 lines 24-68 with up to 15 wt% Si, up to 5 wt% Cu, 5-25 wt% magnesium silicide (1.73 x Si), and the remainder aluminum, where the silicon may be replaced entirely or in part by magnesium in an amount of up to 15 wt% (m). Therefore, the aluminum alloy of Schmid is not required to have excess silicon and thus the composition of the aluminum alloy of Schmid overlaps with the composition of the aluminum alloy recited in the instant claims as set forth in the above rejections. In the absence of factual evidence to the contrary, the Examiner takes the position that the aluminum alloy formed by the combination of the above cited references would have properties similar to those of the aluminum alloy produced by the method of the instant claims.

***Conclusion***

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN FOGARTY whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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